

Extended long-segment Hirschsprungs' disease in the Waardenburg–Shah syndrome

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Hypopigmentation, either a white forelock or changes in the eyebrows and/or isochromia irides, associated with signs of bowel obstruction should alert the paediatrician and paediatric surgeons to the possibility of aganglionosis. We report a case of Waardenburg–Shah syndrome, which is a very rare congenital disorder with variable clinical expression, characterized by Hirschsprungs' disease and abnormal melanocyte migration, resulting in pigmentary abnormalities and sensorineural deafness. Our patient had an exceptional association of extended long-segment aganglionosis and underwent a proximal ileostomy but did not survive until a definitive procedure was performed. Long-term prognosis

Introduction

The Waardenburg–Shah syndrome is an autosomal recessive disease where Hirschsprungs' disease and the Waardenburg syndrome are present together. It is also known as Waardenburg syndrome type 4, it is rare but not exceptional, having more than 48 published cases [1]. Waardenburg–Shah syndrome patients have a higher incidence of total colonic aganglionosis with or without small-bowel involvement. Such babies are seriously malnourished and show higher association of enterocolitis [2]. We report a case of Shah–Waardenburg syndrome with extended long-segment aganglionosis.

Case report

A 3-day-old full-term male neonate was admitted with a history of bilious vomiting and constipation since birth. Parents had a consanguineous marriage, and the sibling of a first-degree relative had died of a similar history during the neonatal period. On examination, he was seen to have a prominent white forelock of hair with heterochromia of both irides and a distended abdomen (Fig. 1). Audiologic evaluation (brain stem evoked response audiometry) revealed complete bilateral sensorineural hearing loss. The abdominal roentgenogram revealed dilated bowel loops but no air-fluid levels. Barium enema showed a microcolon with no obvious transitional zone; the small-bowel loops were distended (Fig. 2).

After a preoperative counselling with parents, an exploratory laparotomy was undertaken that revealed distended jejunal and proximal ileal loops; the 25 cm of terminal ileum and the colon were contracted (Fig. 3). Multiple seromuscular biopsies were taken from the colon and terminal ileum; appendectomy was also performed. An ileostomy was performed at the transitional zone. Frozen section biopsy was not available at our institute, and the tissues were subjected to paraffin treatment. The histopathology confirmed aganglionosis in the colon, appendix, and terminal ileum and showed ganglion cells at the ileostomy site. Postoperatively, the baby did not gain

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weight adequately and he was on lactose-free, high-calorie oral feeds. However, the baby needed repeated admissions because of recurrent diarrhoea, and he died because of sepsis at the age of 6 months at last admission.

Discussion

Petrus Johannes Waardenburg [3] initially described the syndrome, which came to be known with his name in 1951, citing the following main features:

- (1) broad nasal root (78%),
- (2) lateral displacement of the medial canthi (75%),
- (3) hypertrichosis of the medial part of the eyebrows (45%),
- (4) heterochromia irides (25%),
- (5) congenital sensorineural hearing loss (unilateral or bilateral; 20%),
- (6) white forelock (17%).

The Waardenburg syndrome is of four types. Types I and II are differentiated by the presence or absence of dystopia canthorum. Type III has associated limb abnormalities. In

Fig. 1



Clinical picture showing white forelock, distended abdomen and heterochromia irides.

Fig. 2

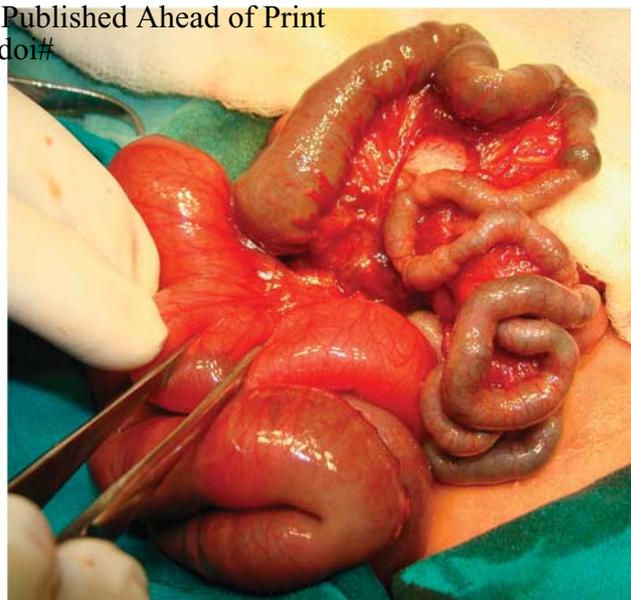


Barium enema showing microcolon with no obvious transitional zone.

1981, Krishnakumar N. Shah [4] described the variant of the syndrome exhibited by this case, the association of Waardenburg syndrome with long-segment Hirschsprung's disease. The Waardenburg–Shah syndrome (type IV) is an unusual variant of the Waardenburg syndrome that is associated with a white forelock, white eyebrows and eyelashes, heterochromic irides and intestinal obstruction due to the presence of long-segment Hirschsprung's disease.

The disease is inherited either as an autosomal recessive trait, from mutations of endothelin-B receptor or endothelin-3 genes, or as an autosomal dominant trait when related to *SOX10* gene mutations [5,6]. The other variants of Waardenburg syndrome are autosomal dominant in inheritance. Genetic counselling for parents is an important task, because the affected family has a 50% risk of having an affected offspring on subsequent pregnancies. The association of Waardenburg's syndrome and Hirschsprung's disease can be explained by the related embryonic origin of melanocytes, the adrenal ganglia, sympathetic ganglia and sensory components of the spinal and cranial

Fig. 3



Intraoperative finding showing dilated proximal ileum and collapsed distal ileum.

nerves. As neural crest cells also migrate to the visceral ganglia of the gastrointestinal tract, it is possible that pigmentary anomalies could be associated with anomalies of the ganglion cells in the viscera.

Our patient had bilateral sensorineural hearing loss, a white forelock, heterochromia irides, and depigmented eyebrows. Although the length of the involved intestinal segment varies in this syndrome, most patients have total colonic aganglionosis with or without small-bowel involvement [2,7]. The baby had total colonic aganglionosis with extended small-bowel involvement (ileum).

A laparotomy is necessary for small-bowel and large-bowel biopsies to identify the level of aganglionosis. Loop ileostomy is performed in case of distal ileal involvement. The surgical treatment of near-total intestinal aganglionosis is difficult and becomes progressively more troublesome with increasing aganglionic length. Ziegler *et al.* [8] and Kimura *et al.* [9] have devised procedures to extend and enhance function with only 10 cm of jejunum. Kimura Stringel's procedure is carried out by opening out the ascending colon along its anterior wall up to the ileocaecal valve and anastomosing the opened out segment of the colon to the most proximal biopsy site in the proximal ileum. In Ziegler's operation, an extended myectomy–myotomy is done, which acts as a passive conduit for proximally propelled nutrients [10].

Conclusion

The syndrome is rare and the preoperative diagnosis is important, because the cost-effectiveness of long-term care in children with the Waardenburg–Shah syndrome and the associated high morbidity and mortality need to be considered before performing surgery.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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